

Studying Our Senses -- Teacher Preparation Notes

Dr. Ingrid Waldron, Department of Biology, University of Pennsylvania, 2009¹

Supplies needed for jellybean experiment:

- disinfectant cloths to clean tables and hands
- one stopwatch or watch per group to time 15 second interval
- plastic spoons
- jellybeans (in snack bags, one per table; but we have had best success with Smuckers or Starburst jellybeans)

Comments concerning flavor experiment

Students may find it easier to try to guess the flavors of the jellybeans if you provide a list of the specific flavors in your jellybean package on the board or in the protocol.

There are five basic types of taste receptor. As expected, sweet taste receptors respond to sugars (and also artificial sweeteners), sour taste receptors respond to H⁺, and salty taste receptors respond to NaCl. Bitter taste receptors respond to a variety of compounds, many of which are poisons. Savory or umami taste receptors respond to glutamate (including monosodium glutamate), aspartate, and certain ribonucleotides. It is not directly relevant here, but it may be useful to know that a typical taste bud contains several different types of taste cells, each of which responds to a different basic taste; thus, the ability to detect each of the different basic taste sensations is widely distributed in many parts of the tongue, contrary to the figures shown in many older biology books.

Points to include in discussion of vision experiment

1. The brain plays an active role in interpreting visual input and converting it to images. Consequently, the same stimulus pattern of black and white can result in different perceived images. This section also illustrates that we focus on a single image at a time and the rest appears as background, so we only see one image at a time.
2. This section illustrates the importance of edges and of learning in visual perception. It is useful to discuss the principles of camouflage here.
3. This section illustrates that we use the size of surrounding objects and perspective to estimate the size of an object.

Many additional useful activities for understanding brain function and sensory processes are available from the Foss Human Brain and Senses Course.

Additional interesting visual illusions and explanations are available at:

<http://blogs.discovermagazine.com/badastronomy/2009/06/24/the-blue-and-the-green/>

and

<http://www.psy.ritsumei.ac.jp/~akitaoka/cataloge.html>

¹ These teacher preparation notes and the related student handout are available at http://serendip.brynmawr.edu/sci_edu/waldron.